CLAIMS

We claim:

1. A fuel pellet package for use with a fuel activation device for a fuel cell, the fuel pellet package comprising:

a packaging;

a hermetically sealed envelope supported within the packaging;

a plurality of fuel pellets, each including hydrogen releasable by the fuel activation device, wherein the fuel pellets are arranged as a stack within the hermetically sealed envelope; and

a first spring configured to exert a first force coupled to the fuel pellets.

2. The fuel pellet package of claim 1, and wherein the packaging and the hermetically sealed envelope are each configured to be selectively openable in response to a predefined action.

3. The fuel pellet package of claim 2, and wherein the predefined action includes usably coupling the fuel pellet package with the fuel activation device.

4. The fuel pellet package of claim 2, and wherein the predefined action includes usably coupling the fuel pellet package with a pellet dispensing device of the fuel activation device.

5. The fuel pellet package of claim 1, and further comprising a desiccant configured to absorb moisture away from the plurality of fuel pellets.

6. The fuel pellet package of claim 1, and further comprising a layer of passivating material disposed between each of adjacent ones of the plurality of fuel pellets, the passivating material configured to prevent moisture from releasing the hydrogen from the fuel pellets.

7. The fuel pellet package of claim 1, and wherein the first spring is further configured to advance the fuel pellets in a predefined direction in response to a removal of a fuel pellet from the stack.

8. The fuel pellet package of claim 1, and further comprising a second spring configured to exert a second force coupled to the fuel pellets in a direction substantially opposite to that of the first force, and wherein the first spring and the second spring are each further configured to advance the fuel pellets in respective predefined directions in response to a removal of a fuel pellet from the stack.

9. The fuel pellet package of claim 1, and wherein each of the fuel pellets is configured to release the hydrogen as a gas in response to contact with an activation liquid.

10. The fuel pellet package of claim 9, and wherein each of the fuel pellets is further configured such that the activation liquid is acidic water.

11. The fuel pellet package of claim 1, and wherein each of the fuel pellets is configured to release the hydrogen as a gas in response to providing electrical energy to an electrically conductive outer coating of the fuel pellet.

12. The fuel pellet package of claim 1, and wherein each of the fuel pellets is configured to release the hydrogen as a gas in response to heating the fuel pellet.

13. The fuel pellet package of claim 1, and wherein each of the fuel pellets includes at least one of $NaBH_4$, CaH_4, or a zeolite.

14. A fuel activation device for use with a fuel cell, comprising:

a fuel activation chamber;

a fuel storage chamber configured to store a plurality of fuel pellets arranged as a stack;

a fuel dispensing device configured to selectively transport a fuel pellet from the stack of fuel pellets to the fuel activation chamber in response to a dispensing input, and wherein the fuel activation device further includes a spring configured to advance the fuel pellets toward the fuel dispensing device in response to a removal of one or more fuel pellets from the stack; and

a fuel initiator supported in the fuel activation chamber and configured to activate a release of a hydrogen gas from the transported fuel pellet, and wherein the fuel activation chamber is further configured to provide the hydrogen gas to the fuel cell through a gas vent.

15. The fuel activation device of claim 14, and wherein the fuel activation chamber is further configured to store a waste product resulting from the release of the hydrogen gas from the fuel pellet by the fuel initiator.

16. The fuel activation device of claim 14, and wherein each of the fuel pellets includes at least one of $NaBH_4$, CaH_4, or a zeolite.

17. The fuel activation device of claim 14, and wherein:

the fuel storage chamber is further configured to receivably store a fuel pellet package including the plurality of fuel pellets arranged as the stack and the spring configured to advance the fuel pellets toward the fuel dispensing device.

18. The fuel activation device of claim 14, and further comprising a desiccant configured to absorb moisture away from the plurality of fuel pellets in the fuel storage chamber.

19. The fuel activation device of claim 14, and further comprising the plurality of fuel pellets arranged as the stack and a layer of passivating material disposed between each of adjacent ones of the plurality of fuel pellets, the passivating material configured to prevent moisture from releasing the hydrogen gas.

20. The fuel activation device of claim 14, and further comprising the plurality of fuel pellets.

21. The fuel activation device of claim 14, and further comprising a hydrophobic membrane supported in the fuel activation chamber, and wherein:

the fuel initiator includes acidic water;

each of the fuel pellets is configured to release the hydrogen gas in response to contact with the acidic water; and

the hydrophobic membrane is configured to permit the hydrogen gas to pass from the fuel initiator through the hydrophobic membrane and to the gas vent.

22. The fuel activation device of claim 21, and further comprising a snorkel tube configured to permit passage of the transported fuel pellet from the fuel storage chamber to the fuel initiator, and wherein the snorkel tube is further configured to prevent the acidic water from entering the fuel storage chamber regardless of the orientation of the fuel activation device with respect to gravity.

23. The fuel activation device of claim 14, and wherein the dispensing input is defined as a signal provided by a controller.

24. The fuel activation device of claim 23, and wherein:

the pellet dispensing device includes a linear actuator coupled to a pusher element;

the linear actuator is coupled in controlled relationship with the controller; and

the linear actuator is optionally one of a solenoid or a linear motor.

25. The fuel activation device of claim 23, and wherein the pellet dispensing device includes one of a ratchet mechanism, an auger mechanism, or a feed magazine mechanism coupled in controlled relationship with the controller.

26. The fuel activation device of claim 23, and wherein:

the fuel initiator includes a heater configured to selectively heat the transported fuel pellet in response to a corresponding signal provided by the controller; and

each of the fuel pellets is configured to release the hydrogen gas in response to being heated by the heater.

27. The fuel activation device of claim 26, and further comprising a support passage extending generally away from the fuel storage chamber into the fuel activation chamber, and wherein:

the support passage is configured to supportingly receive the transported fuel pellet from fuel storage chamber by way of the pellet dispensing device regardless of the orientation of the fuel activation device with respect to gravity;

the heater is further configured to heat the fuel pellet supportingly received within the support passage; and

the support passage is further configured to fluidly couple the hydrogen gas to the fuel activation chamber.

28. The fuel activation device of claim 23, and wherein:

the fuel initiator includes at least two electrodes each configured to couple electrical energy provided by the controller to the transported fuel pellet; and

each of the fuel pellets is configured to release the hydrogen gas in response to the electrical energy coupled by the at least two electrodes.

29. The fuel activation device of claim 28, and wherein:

each of the at least two electrodes is coupled to a respective spring such that the at least two electrodes define a clamp assembly configured to supportingly receive the transported fuel pellet from fuel storage chamber by way of the pellet dispensing device regardless of the orientation of the fuel activation device with respect to gravity; and

the clamp assembly is further configured to fluidly couple the hydrogen gas to the fuel activation chamber.

30. The fuel activation device of claim 28, and wherein the fuel initiator further includes a plurality of electrodes each electrically coupled to the controller; and

the plurality of electrodes is arranged to define a grid configured to support the fuel pellet during the provision of the electrical energy.

31. The fuel activation device of claim 30, and wherein the plurality of electrodes is further configured such that portions of the grid are selectively electrically energizable by the controller.

32. A method of providing hydrogen to a fuel cell, comprising:

providing a plurality of fuel pellets, the fuel pellets including hydrogen;

arranging the plurality of fuel pellets as a spring loaded stack;

transporting a fuel pellet from the stack;

activating a release of the hydrogen as a gas from the transported fuel pellet; and

providing the hydrogen gas to the fuel cell.

33. The method of claim 32, and further comprising protecting the plurality of fuel pellets arranged as a stack against contact with moisture.

34. The method of claim 32, and wherein the activating includes placing the transported fuel pellet into contact with an activation liquid.

35. The method of claim 32, and wherein the activating includes heating the transported fuel pellet.

36. The method of claim 32, and wherein the activating includes providing electrical energy to the transported fuel pellet.

37. A method of packaging fuel pellets, comprising:

providing a packaging defining a chamber;

supporting a impermeable material within the chamber;

supporting a plurality of fuel pellets as a stack substantially within the impermeable material, the fuel pellets including hydrogen;

sealing the impermeable material thus defining a hermetically sealed envelope about the plurality of fuel pellets; and

sealing the chamber about the hermetically sealed envelope.

38. The method of claim 37, and further comprising:

supporting a spring within the chamber; and

exerting a force coupled to the stack of fuel pellets using the spring.

39. The method of claim 37, and further comprising supporting a desiccant within the hermetically sealed envelope.

40. The method of claim 37, and further comprising supporting a layer of passivating material between each of adjacent ones of the fuel pellets within the stack.